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DATA CHARGING METHOD AND DATA CHARGING SYSTEM  
[Deta kakin hoho oyobi deta kakin shisutemu]

Jun Nakai, et al.

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INVENTOR(S) (72): Jun Nakai, et al.

APPLICANT(S) (71): Japan Communications Inc.

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The present invention pertains to the data charging technology. In particular, the present invention pertains to a technology that can be used efficiently in data charging treatment, etc. along with data communication and access to information resources on the information network by means of the information network using a cell phone, personal computer, or other information communication terminals.

### Background technology

For example, in data communication on the internet or other information network, data are transmitted/received between computers in a data format known as packets. The charging schemes of the network can be roughly divided to two types, namely, a charging type according to the passed packet quantity with the packet quantity (data quantity) taken as the charging object, and a charging type according to the connection time with the utilization time as the charging object. In both charging systems, charging is performed by distinguishing the communication fees for different utilization purposes, such as contents of use from computer, cell phone, PHS (Personal Handyphone System), PDA (Personal Digital Assistant), or other portable terminals (hereinafter to be referred to as portable terminals), mail and VoIP (Voice Over IP), etc. (hereinafter to be referred to as utilization purposes).

That is, in the prior art, a provider of cell phones and PHS acquire the communication log that records the total number of the passed packets that have passed the network of the network of the provider, and on the basis of the communication log, computes the communication fee, which is then added to the fixed monthly fee for information supply to determine the total fee for using the system. In this case, for both the line exchange system and the packet communication system, it is impossible to specify the utilization purpose. Consequently, in conventional data communication, there is no way to

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\* [Numbers in right margin indicate pagination of the original text.]

realize a system that can distinguish the communication fees for different utilization purposes from the computer and portable terminal.

## Disclosure of the invention

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As computers and portable terminals become popular, data communication systems have been widely adopted in enterprises. However, in many cases, there is a demand for distinguishing the communication fees for different utilization purposes from personal computer and portable terminal as one of the conditions for adopting this system.

That is, when a portable terminal is used in business, etc., the scheme that the user carries a portable terminal for both business use and personal use is more convenient than the scheme that the user carries plural portable terminals for business use and personal use, respectively, from the viewpoint of management. In this case, of course, there is a demand to distinguish the communication fee for utilization with purpose of business and the communication fee for utilization with purpose of personal use, so that the company only picks up the communication fee for the business use (hereinafter to be referred to as distinguishing between business and personal uses). However, in the prior art, there is no way to distinguish said data communication fees. This is a problem to be addressed.

In addition, from the viewpoint of the providers of cell phones and PHS, etc. who provide the data communication services, according to the conventional inclusive charging system, it is impossible to set different unit prices for different utilization purposes and data types, etc. so as to improve the service and to provide a variety of different services. This a technical topic to be addressed.

The purpose of the present invention is to solve the aforementioned problems of the prior art by providing a data charging technology characterized by the fact that in the data communication of the type of charging according to passed packet quantity, charging of the specific fee is performed for each

utilization purpose of the information network and information resources used from computers, portable terminals, and other information communication terminals.

Another purpose of the present invention is to provide a data charging technology that allows reliable charging for a variety of different utilization purposes in data communication using an information network by information communication terminals.

Yet another purpose of the present invention is to provide a type of data charging technology that can improve convenience for users and businesses by using information communication terminals for both business and personal uses, and can charge appropriately by clearly distinguishing the business and personal uses of the information communication terminals and the data communication.

Yet another purpose of the present invention is to provide a type of data charging technology that allows providing of a variety of services by setting various unit prices for different utilization purposes and different data types, etc.

Yet another purpose of the present invention is to provide a data charging technology that can find out the utilization states of different utilization purposes by the user at the information communication terminal, so as to realize reliable marketing in the data communication service. /3

The present invention provides a data charging method characterized by the fact that in the data charging method that performs charging corresponding to the quantity of the data in the information network where information communication terminals are used to perform transmission/reception of information by the users, the data quantity is classified for different utilization purposes of data and collected so that a charge is made for each utilization purpose.

The present invention provides a type of data charging system characterized by the fact that in the data charging system that performs charging corresponding to the data quantity on the information

network where information communication terminals are used by the users to perform transmission/reception of information, there are the following parts:

- a network segment connected to the information network,
- a data communication path controlling means that fixes the data communication path pertaining to a prescribed user such that it passes through the network segment,
- a first data collecting means that collects the first information containing the quantity of the data pertaining to the data passing said network segment,
- a second data collecting means that collects the second information that allows specification of the utilization purpose by each individual user for the data passing through the network segment,
- and a charging information generating means that generates the charging information for each utilization purpose on the basis of the first and second information.

As a more specific example, a network segment in the information network is prepared, and the following functions in the network segment are set. The functions set in the network segment include the function in collecting the packet that passes the network segment (hereinafter to be referred to as a packet collecting function), an authentication function for specifying the user from the portable terminal and the computer (hereinafter to be referred to as an authentication function), a menu function that navigates the user of the portable terminal or computer after authentication, utilization purpose specifying function that forcibly makes all of the data communication after the authentication pass through the default network segment and specifies the utilization purpose (hereinafter to be referred to as data communication path fixing function), and the charging information generating function (hereinafter to be referred to as charging information generating function).

As the utilization procedure, the user is contacted with the utilization purpose of the authentication function of the default network segment so that the data communication from the portable terminal and

computer is performed through the network segment of the present invention.

That is, the user who demands the service distinguishing the business and personal uses of the communication fees for data communication is notified with the necessity in performing authentication function of the default network segment.

The menu function displays the menu corresponding to the utilization frequency of the user who has succeeded in authentication, and it prompts its use. However, it is not an indispensable function of the present invention.

Then, by means of the data communication path fixing function, the data communication performed by the user has to go through the default network segment. With this data communication path fixing function, the use of the user is recorded (hereinafter to be referred to as communication recording). Here, all of the data that pass through the default network segment are continually recorded by the packet collecting function (hereinafter to be referred to as packet recording). From the communication records and the packet records, the charging information that realizes the specific fee for each use is generated by the charging information generating function.

In this way, according to the data charging technology of the present invention, the use is specified from the information communication terminal, and communication fees generated for different services by the user are collected, and this allows collection of fees with a service information fee added for each use. In addition, it is possible to allow free setup of the charging unit and setup a unit price for both the communication fee and information fee.

In addition, by means of the information obtained with the packet collecting function and the data communication path fixing function, the information provider is supplied with information about the user who has accessed the information resources provided by the information provider. For example, from the side of the information provider, it is possible to perform PUSH type marketing to provide

prescribed information and services to prescribed users. In addition, it is possible to provide to the information provider the information of the use state effective for the marketing management pertaining to streamline the uses for each specific user of the utilization purpose.

For the provider of the network and processes, it is possible to provide free services. For example, it is possible to realize a variety of services, such as deduction of the communication fee and information fee for certain number of uses, changing of the menu of the users of a specific function, etc.

#### Brief description of the figures

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Figure 1 is a schematic diagram illustrating an example of the overall constitution of the data charging system as embodiment of the data charging method in an embodiment of the present invention.

Figure 2 is a schematic diagram illustrating an example of the constitution of the data charging system as embodiment of the data charging method in an embodiment of the present invention.

Figure 3 is a schematic diagram illustrating an example of the operation of the data charging method and data charging system in an embodiment of the present invention.

Figure 4 is a schematic diagram illustrating an example of the operation of the data charging method and data charging system in an embodiment of the present invention.

Figure 5 is a schematic diagram illustrating an example of the operation of the data charging method and data charging system in an embodiment of the present invention.

Figure 6 is a flow chart illustrating an example of the operation of the data charging method and data charging system in an embodiment of the present invention.

Figure 7 is a flow chart illustrating an example of the operation of the data charging method and data charging system in an embodiment of the present invention.

Figure 8 is a diagram illustrating an example of the menu picture used in the data charging method and data charging system in an embodiment of the present invention.

Figure 9 is a block diagram illustrating an example of the operation of the data charging method and data charging system in an embodiment of the present invention.

Figure 10 is a block diagram illustrating an example of the operation of the data charging method and data charging system in an embodiment of the present invention.

Figure 11 is a block diagram illustrating an example of the constitution of the data charging method and data charging system in another embodiment of the present invention.

Figure 12 is a flow chart illustrating an example of the operation of the data charging method and data charging system in another embodiment of the present invention.

#### Optimum embodiments of the invention

In the following, an explanation will be given in more detail regarding the embodiments of the present invention with reference to the figures.

#### Embodiment 1

Figure 1 is a schematic diagram illustrating the overall constitution of the data charging system for embodiment of the data charging method in an embodiment of the present invention. /6

Figure 2 is a schematic diagram illustrating an example of the constitution of the data charging system for embodiment of the data charging method in this embodiment.

Figures 3, 4 and 5 are schematic diagrams illustrating an example of the operation of the data charging method and data charging system of the present embodiment. Figures 6 and 7 are flow charts illustrating an example of the operation of the data charging method and data charging system in the

present embodiment. Figure 8 is a diagram illustrating an example of the menu picture used in the data charging method and data charging system in the present embodiment. Figure 9 is a block diagram illustrating an example of the operation of the data charging method and data charging system of the present embodiment.

In this embodiment, explanation will be made on the example of data charging treatment in the case of access from an information communication terminal to information resources on WWW (worldwide web) (hereinafter to be referred to as Web) constructed by means of HTTP (Hyper Text Transmission Protocol) on the internet using TCP/IP communication protocol as an example of the information network.

That is, explanation will be given for the case of identification of the utilization purpose of each user in the URL (Uniform Resource Locator) in this embodiment. Here, URL is used as the pointer information for accessing the prescribed information resources on the Web.

### 1-1. Design and setup of network

In the present embodiment, in order to enable the charging treatment to be explained later, a network segment that has to be used by the user is set. It is realized as a network segment that allows connection or communication to internet and various network providers. Here, design is performed so that the data other than the object of the data charging in the present embodiment do not pass through the default network entirely. The aforementioned condition is met by setting the hardware for realizing the various functions of the present embodiment and the least necessary network equipment in the network segment.

More specifically, in the example shown in Figure 1, the user can access internet (300) via information communication terminal (100), such as portable terminal (101) and personal computer (102) (hereinafter to be referred to as computer (102)). Said internet is connected to network segment (201)

that forms data charging system (200) for embodiment of the data charging method in the present embodiment. The constitution allows access via network segment (201) to the various information resources, that is, internal contents server (202) inside network segment (201), external contents server (301) inside internet (300), contents server (401) inside intranet (400).

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Said data charging system (200) in this embodiment is composed of authentication function (200a), menu function (200b), data communication path fixing function (200c), packet collecting function (200d), charging information generating function (200e), etc.

## 1-2. Setup of hardware for various functions

The functions of said authentication function (200a), menu function (200b), data communication path fixing function (200c), packet collecting function (200d) and charging information generating function (200e) that form said data charging system (200) are realized by means of computer system and computer software, as well as network equipment. The number and the operating system of the computers can be selected at will.

Figure 2 is a diagram illustrating in detail an example of network segment (201) that forms data charging system (200) in the present embodiment.

In network segment (201), the computer (not shown in the figure) that realizes the functions of said authentication function (200a) ~ charging information generating function (200e) is connected to internet hub (208) to form a LAN (Local Area Network), and said LAN is connected via router (207) and router (209) to internet (300) and intranet (400).

User management database (203) is connected to authentication function (200a) and menu function (200b). Said user management database (203) is composed of user information (203a), user coder

(203b), password (203c), log-in ID (203d), terminal ID (203e), telephone number (203f), company name (203g), menu information (203h), and other information.

Communication records database (204) is connected to data communication path fixing function (200c), and it accommodates the communication records collected by said data communication path fixing function (200c). That is, data stored in communication records database (204) include date/time (204a), sender IP address (204b), sender TCP port number (204c), terminal ID (204d), URL (204e), business/personal use distinguishing flag (204f), etc.

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Said packet collecting function (200d) is composed of packet counter (205) and packet collection database (206). Said packet collection database (206) stores the following information: receiver IP address (206a), sender IP address (206b), receiver TCP port number (206c), sender TCP port number (206d), sequence number (206e), identification number (206f), offset flag (206g), date/time (206h), data size (206i), etc.

### 1-3. Packet collection

With said packet collecting function (200d), all of the packets that pass through network segment (201) and all of the packets generated inside network segment (201) can be collected and recorded in this embodiment. What is recorded is all of the information contained in the packet (IP packet in the Ethernet frame). The important items include receiver IP address (206a), sender IP address (206b), receiver TCP port number (206c), sender TCP port number (206d), sequence number (206e), identification number (206f), offset flag (206g), date/time (206h), data size (206i), etc., which all are information contained in the normalized IP packet in the Ethernet frame. The packet records that have all of the information contained in the packet recorded in it are generated and stored in packet collection database (206).

Among said stored information, sender IP address (206b), sender TCP port number (206d) as well as receiver IP address (206a) and receiver TCP port number (206c) are compared with the communication records stored in communication records database (204) generated by data communication path fixing function (200c) for identifying the user. On the other hand, said sequence number (206e), identification number (206f), offset flag (206g), date/time (206h), and data size (206i) are used in specifying the packet generated when one function (URL) is used, and in computing the sum of the data size.

#### 1-4. Authentication

By means of authentication function (200a), the user of portable terminal (101), computer (102), or other information communication terminal (100) is specified. In principle, log-in ID (203d) and password (203c) are issued beforehand, and they are notified to the user. In addition, the user is notified with URL of authentication function (200a). The user makes use of authentication function (200a) to perform authentication using the log-in ID and the password, an operation that has to be performed when connection is made to network segment (201). The information of log-in ID (203d) and password (203c) is stored in user management database (203). Also, when intrinsic terminal ID (203e) incorporated in information communication terminal (100), such as portable terminal (101) or computer (102), etc. can be acquired, it is also used for authentication at the same time. In this case, the information of said terminal ID (203e) is also stored in user management database (203).

Whether authentication is performed successfully is notified to menu function (200b). If it is a success, control is transmitted to menu function (200b). If authentication fails, the user is prompted to repeat the authentication within the controlled number of rounds. However, if the tolerable number of rounds of failure is overrun, use by the user is stopped.

Here, as needed, the ID information of the user for authentication may also be used in the treatment for distinguishing business and personal uses when the communication fee request form is prepared by charging information generating function (200e).

In practice, an input column for the log-in ID and password is displayed at information communication terminal (100), such as portable terminal (101), computer (102), etc., and the user is asked to input the log-in ID and password. When authentication is made successfully, control is transmitted to menu function (200b). If authentication fails, the state of the failure as well as its cause are displayed together with the log-in ID and password in the input column. When it fails over the tolerable number of rounds, said log-in ID is locked (not for use), and authentication of the user itself is prohibited.

#### 1-5. Guiding for user by menu (navigation)

When authentication is made successfully, in order to restrict the operation of information communication terminal (100), such as portable terminal (101), computer (102), etc., menu (500) (such as that shown in Figure 8) is displayed, and the use that can be used is fixed. The specific menu corresponding to each user is pre-registered in menu information (203h) of user management database (203). On the other hand, when authentication fails, it is checked whether authentication function (200a) is within the tolerable number of rounds of failure, and, if YES, the user is prompted to repeat the authentication operation. On the other hand, if the tolerable number of rounds of failure is surpassed, the state is displayed to the user, and use is stopped.

That is, the user information is acquired from authentication function (200a), and menu (500) appropriate for the organization which the user belongs is displayed on information communication terminal (100), such as portable terminal (101), computer (102), etc.

As the user performs operation along said menu (500), by making reference to menu information (203h) stored in user management database (203), judgment is made on whether the URL assigned by the selected menu item is physically out of default network segment (201).

Even when the information resource specified by the assigned URL is out of network segment (201), by means of data communication path fixing function (200c), the data communication still passes through default network segment (201) for sure. Also, menu items that can be directly assigned by the user are also prepared, and design is made such that even when the URL is assigned by the user from the menu items, the data communication still definitely passes through the default network segment (201).

Similarly, the menu item selection by the user can be distinguished as either related to business use or not as is recorded by means of the business and personal uses distinguishing information preset in said menu information (203h).

#### 1-6. Control of the data communication path of the user

Said data communication path fixing function (200c) is used to fix the data communication path such that all of the communication of the user goes through default network segment (201).

When the information resource specified by URL is within default network segment (201), such as in the case of access to internal contents server (202), even data communication path fixing function (200c) is not used, the data communication still definitely goes through default network segment (201). Only in this case, data communication path fixing function (200c) generates the communication records about which URL has been visited by the user. For the communication records that assign the information resource out of default network segment (201), remote URL proxy acquisition function (200c-1) to be explained later generates the communication records. Recorded in the communication records are user's terminal ID (204d), date/time (204a), URL (204e), user sender IP address (204b), user sender TCP port

number (204c), business/personal use distinguishing flag (204f), etc. Collection of the communication records is performed on the protocol hierachal level of HTTP or the like on TCP/IP.

By means of packet collecting function (200d), all of the packet information on the Ethernet level going through default network segment (201) realized by data communication path fixing function (200c) is stored in packet collection database (206) as packet records, and by merging it with the information of communication records database (204), it is possible to charge the specific fee of the communication fee for each URL. /11

When there is no data communication path fixing function (200c) of the present embodiment as in the prior art, the data communication that acquires the URL (information resource) out of default network segment (201) from said information communication terminal (100), such as portable terminal (101), computer (102), etc. does not go through default network segment (201), because of the direct communication between the server that distributes the contents of said URL and portable terminal (101) or computer (102). Consequently, all of the packet records cannot be stored, and generation of the charging data becomes impossible.

#### 1-7. Acquisition of proxy of remote URL

In order to make use of URLs to assign and use the contents of external contents server (301) on internet (300) or the information held by contents server (401) in intranet (400) out of network segment (201), remote URL proxy acquisition function (200c-1) acquires the information resource specified by URL out of network segment (201), and sends it to portable terminal (101) or computer (102) or the requester. Said remote URL proxy acquisition function (200c-1) forms a portion of data communication path fixing function (200c).

In the following, an explanation will be given regarding an example of the operation of remote URL proxy acquisition function (200c-1) with reference to Figure 9. In the example shown here, it is assumed that the contents on Web out of network segment (201) are in use. URL of data communication path fixing function (200c) is set at "http://menu.xx.co.jp", and menu (500) is displayed for the user who have succeeded in authentication with the server. When the user want to take "http://www.yyy.com/zzz.html" as reference, in menu (500) of the present embodiment, link to said URL is taken as "http://menu.xx.co.jp/agent.cgi?www.yyy.com/zzz.html". The portion of "agent.cgi" of this URL is the portion for use in remote URL proxy acquisition function (200c-1). In practice, the letter sequence of said "agent.cgi" may be selected at will. As the URL is assigned in this form, remote URL proxy acquisition function (200c-1) acquires all of the contents assigned by URL specified by the letter sequence starting after "?", and transmits the contents to user portable terminal (101) or computer (102). However, when link to other URL (information resource) is contained in said contents, because it is impossible to fix the data communication path all the time to network segment (201), before transmitting the contents to user's portable terminal (101) or computer (102), the contents are transmitted to address conversion function (200c-2) to be explained later, and what obtained by rewrite of the address to the form of "http://menu.xx.co.jp/agent.cgi?www.yyy.com/zzz.html" is acquired and transmitted to user's portable terminal (101) or computer (102). /12

Said remote URL proxy acquisition function (200c-1) also generates the communication records to communication records database (204).

#### 1-8. Address conversion in real time

Although the data communication path can be fixed to pass through network segment (201) by means of remote URL proxy acquisition function (200c-1), in order to have it function steadily, as shown in

Figure 9, address conversion function (200c-2), which can perform real time conversion of the address of the contents of URL, etc. acquired by remote URL proxy acquisition function (200c-1) to said form, is set as a portion of data communication path fixing function (200c).

In said example, by means of address conversion function (200c-2), in the URL out of network segment (201) displayed by data communication path fixing function (200c), the pre-append portion of "<http://menu.xx.co.jp/agent.cgi?>" in the system is automatically inserted into the system. That is, said address conversion function (200c-2) performs real time analysis of URL of the contents acquired by remote URL proxy acquisition function (200c-1), and performs rewrite conversion to said URL, and it then again returns the contents to remote URL proxy acquisition function (200c-1). For example, when there are links to other URLs, such as "Up.html", "middle.html", "lower.html" in the acquired contents, the contents are analyzed in real time to detect said links, and the link of the contents is written in URL in the form of "http://menu.xx.co.jp/agent.cgi?www.yyy.co.jp/Up.html".

"http://menu.xx.co.jp/agent.cgi?www.yyy.co.jp/middle.html".

"http://menu.xx.co.jp/agent.cgi?www.yyy.co.jp/lower.html"".

In this way, all of the URLs in the contents acquired by remote URL proxy acquisition function (200c-1) are rewritten so as to go through network segment (201), and thus data communication path fixing function (200c) can function steadily all the time.

#### 1-9. Contents cache

In order to provide data communication path fixing function (200c), remote URL proxy acquisition function (200c-1) and address conversion function (200c-2) to more users, and to allow use at a higher efficiency yet with reduced load, cache function (200f), which temporarily holds the contents after address conversion, is set, and when the contents are to be used again by another user or the same user,

the contents temporarily held in cache function (200f) are transmitted to the user's portable terminal (101) or computer (102).

Setup is made such that the cached contents are used when remote URL proxy acquisition function (200c-1) acquires the contents. That is, remote URL proxy acquisition function (200c-1) first checks yes/no of the target contents in cache function (200f), and, if YES for the contents stored in cache function (200f), the contents in cache function (200f) are transmitted to user portable terminal (101) or computer (102), and if NO, the newly acquired contents are transmitted. As a result, records of use of the contents temporarily stored in cache function (200f) are also stored by remote URL proxy acquisition function (200c-1) in communication records database (204).

The cached contents should be refreshed on a regular basis to be in agreement with the original contents. The cached contents are erased after a prescribed time. Said cache function (200f) has said various functions. Also, in the case of dynamic contents (such as the contents that have the display state vary corresponding to the input contents of the user to the contents display picture), cache function (200f) performs analysis of whether the contents are dynamic contents. When YES, after the contents acquired in cache function (200f) are transmitted to the user, they are erased immediately. /14

With said functions, for the user of information communication terminal (100), such as portable terminal (101), computer (102), etc., data communication is definitely performed via default network segment (201) after authentication, and it is possible to determine the data communication state corresponding to the utilization purpose of URL, etc.

#### 1-10. Generation of charging information

By means of charging information generating function (200e) shown in Figure 10, the packet records stored in packet collection database (206) are compared with the communication records stored in

communication records database (204) to generate the charging information. More specifically, with sender IP address (204b) ((206b)) and sender TCP port number (204c) ((206d)), which are the common portion of the records items of the packet records stored in packet collection database (206) and the records items of communication records database (204), taken as a key, the two records portions are synthesized to generate the charging records. In each of charging records, the information about where (terminal ID (204d)), when (date/time (204a)), and which URL (URL (204e)) are used to contain the sum of the packet data generated in reading of one URL (URL (204e)) (sum of data size (206i)) pertaining to said URL (204e)), business and personal uses distinguishing information (business/personal use distinguishing flag (204f)), etc.

When the user or the company of the user (company name (203g)) signs a contract for the business and personal uses distinguishing request service using data charging system (200) of the present embodiment, the business and personal uses distinguishing information presents the following contract information to the user of the data charging system of the present embodiment: list of URLs displayed in menu function (200b), the flag information of URL to be requested by the company and the URL to be requested by the individual user, assignment of business or personal use for the data communication fee without going through data charging system (200) in the present embodiment. Also, the information of URL that charges the information quantity separately is set as a portion of, say, user information (203a), is set in user management database (203).

Said charging information generating function (200e) generates the user's charging information on the basis of the charging records. More specifically, the charging records are collected for each user, and collection is performed for the business and personal uses, respectively. As far as the fee of communication that does not go through data charging system (200) in the present embodiment, it is

impossible to distinguish the communication fee, so that dividing of the requests on distinguishing of business and personal uses is performed on the basis of the decisions made when the contract is signed.

In the present embodiment, the communication fees not through data charging system (200) means the difference ( $\Delta$ ) obtained by comparing the pre-charging information and the information of details of the data communication fees from the providers of cell phone and PHS (call detail records (CDR information (600)).

Said CDR information (600) is composed of telephone number (601), call type/details type (602), call year/month (603), call details classification/call type (604), byte number (605), packet number (606), call fee sum (607), and other information.

That is, suppose  $G$  represents the data quantity (byte number) corresponding to the prescribed telephone number (601) (terminal ID (204d)) described in CDR information (600),  $C$  represents the sum of data size (206i) pertaining to terminal ID (204d) obtained by collecting said charging records by a single terminal ID (204d) (corresponding to telephone number (601)),  $C_p$  represents the sum of data size (206i) for personal use pertaining said terminal ID (204d), and  $C_j$  represents the sum of data size (206i) of business use pertaining to said terminal ID (204d), one has  $C (=C_p+G_j) < G$ , and  $\Delta = G-C$ .

Consequently, when charging data sheet (700) is formed, for each user (terminal ID (204d)), the sum of  $C_p$ ,  $C_j$  as the result of collection distinguished for business and personal uses via data charging system (200) in the present embodiment, and the portion according to the contract item of  $\Delta$  as the result of collection of the portion no going through said data charging system is generated, and the results are listed in business use details column (701) and personal use details column (702). In this case, while not shown in the figure, in each of business use details column (701) and personal use details column (702), the detailed information for each URL (use purpose) are added.

Also, when there is a basic fee charged irrelevant to the data use fee for each terminal ID (204d), one may also adopt a scheme in which addition is made to any of Cp and Cj as the result of collection with distinguishing made on the business and personal uses, or requests can be made corresponding to the proportions of Cp and Cj.

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Also, when said charging data sheet (700) is formed, the information of the communication fee of URL (utilization purpose) and the information quantity are added to the pre-charging information by means of the function of setup of any unit price with respect to the prescribed URL (use purpose), the function that takes the prescribed URL (use purpose) as exempt of charging, the function in taking plural URL (use purposes) as one charging unit and setting the unit price in the unit, and the function of charging of the information quantity. Also, one may also adopt a scheme in which discount is made corresponding to each of quantities of Cp, Cj as sums the communication fees for business and personal uses, respectively.

With said charging information generating function (200e), it is possible to set the specific fee for each use purpose in the data communication using internet (300) or other information network. Also, it is possible to realize distinguishing between business and personal uses for the communication fee and information quantity.

In the explanation of said charging information generating function (200e), as an example, it has been assumed that the provider provides the data according to CDR information (600) for the total packet number of each of portable terminal (101), such as cell phone, PHS, etc. However, the present invention is not limited to this case. One may also adopt a scheme in which the charging information of charging data sheet (700), etc. is generated simply by counting and computing using data charging system (200) of the present embodiment.

In the following, an explanation will be given regarding an example of the overall operation of the data charging method and data charging system in the present embodiment with reference to Figures 3, 4, 5, 6 and 7.

First, in network segment (201) of data charging system (200), the communication data passing through network segment (201) are continually monitored and recorded on the level of the Ethernet packet by means of packet collecting function (200d) composed of packet counter (205) and packet collection database (206).

In this state, at any chance, the URL notified beforehand by e-mail or the like to the user of information communication terminal (100) is used, and as the user accesses authentication function (200a) of data charging system (200) via internet (300) (step 10, step 11, step 15), the input box for the log-in ID and password is displayed (step 12), and after input of the log-in ID and password (step 13), with reference to the entry of log-in ID (203d) and password (203c) of user management database (203), the input log-in ID and password are checked to perform user authentication (step 14). If authentication fails, in the tolerable number of rounds, input is retried for the log-in ID and the password (step 17, step 16). When the tolerable number of rounds of failure is surpassed, the state is displayed as an error (step 18), the account of the log-in ID is locked (step 24), and the line is cut (step 25).

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On the other hand, when authentication is successful, as shown in Figure 8, the picture of menu (500) is displayed, and each item can be selected by the user (step 19).

Then, judgment is made on whether the selected item by the user in menu (500) is access to the information resource (internal contents server (202)) of network segment (201) (step 20). When it is access to network segment (201), as indicated by the broken line in Figure 3, via access path A1 and access path A2, the contents of internal contents server (202) are read by the user of information communication terminal (100), and at the same time, each time of the contents (URL) of internal

contents server (202) are used, the communication records are recorded in communication records database (204) (step 21). In this case, the various treatments shown in Figure 9 by data communication path fixing function (200c) are not needed, and execution is not performed.

On the other hand, when the item selected by the user in menu (500) corresponds to access to the information resource out of network segment (201) (external contents server (301) or contents server (401) of intranet (400)), various treatments shown in Figure 9 are executed by means of data communication path fixing function (200c) (in the case of access to external contents server (301), it goes through the following paths indicated by broken line in Figure 4: access path A3, access path A4, access path A5, access path A6, etc.) (in the case of access to contents server (401) of intranet (400), it goes through the following paths indicated by broken line in Figure 5: access path A7, access path A8, access path A 9, access path A 10), as path control is performed to ensure that the communication data pass through network segment (201) for sure (step 26), and the communication records are recorded in communication records database (204) (step 27).

Here, as shown in Figure 7, in the treatment of data communication path fixing function (200c) in step 26, first, judgment is made on whether there is the target contents in cache function (200f) (step 26a). If there is cache hit, the contents in cache function (200f) are sent for the user to read (step 26b), and the communication records are recorded in communication records database (204) (step 26c). /18

When the target contents are not in cache function (200f), remote URL proxy acquisition function (200c-1) is turned ON (step 26d), and while the value of the URL error counter that manages the number of rounds of failure in URL proxy acquisition is smaller than the prescribed tolerable value (step 26e), efforts are made to get proxy of URL explained with reference to Figure 9 in the above (step 26f). Judgment is made on yes/no of acquisition (step 26g). In YES, address conversion function (200c-2) is turned ON to perform address conversion for the contents (step 26h), and then the converted contents

are written in cache function (200f) (step 26i), and the contents can be read by the user via cache function (200f) (step 26b). On the other hand, when proxy acquisition fails in step 26g, addition is performed for the URL error counter (step 26m), and the operation from step 26d thereafter is repeated. In step 26e, if the URL error counter surpasses the tolerable value, an error message indicating failure of proxy acquisition of the contents specified by said URL is displayed (step 26j), and then the line is cut (step 26k).

Now, return to the flow chart shown in Figure 6. At the end of access to each URL, on the basis of distinguishing of the business and personal uses for each URL, judgment is made on distinguishing of business and personal uses of access (step 22). Distinguishing of business and personal uses is set in business/personal use distinguishing flag (204f) (step 23, step 28), and it returns to the treatment for display of menu (500) of step 19, and the treatment of step 19 and thereafter is repeated until log-out.

As explained above, according to the data charging method and data charging system of the present embodiment, acquisition of the communication records has a high efficiency, the treatment number of packet counting and the counting treatment time can be cut, and a high degree of freedom can be kept for the charging function.

That is, according to the data charging method and data charging system of the present embodiment, for example, in the data communication of the passed packet number charging type using internet (300) or other information network, it is possible to realize specific fee charging for different utilization purposes for the information network and information resources used by information communication terminal (100), such as portable terminal (101), computer (102), etc.

Also, in the data communication using internet (300) or other information network by information communication terminal (100), it is possible to perform reliable charging for a variety of utilization purposes.

In addition, it is possible to improve the convenience for the user and business by using information communication terminal (100) shared for business and personal uses, and it is possible to realize appropriate assignment of the fees by clearly defining the business and personal uses of information communication terminal (100) and data communication.

In addition, by setting the various unit prices for different utilization purposes and different types of data specified by URL, etc. on internet (300), it is possible to provide a variety of services.

Also, it is possible to find out the use state of each utilization purpose by the user of information communication terminal (100) and to realize reliable marketing of data communication services.

## Embodiment 2

Figure 11 is a block diagram illustrating an example of the constitution of the data charging method and data charging system in another embodiment of the present invention. Figure 12 is a flow chart illustrating an example of its operation.

In this Embodiment 2, the case of use of e-mail on internet (300) is presented as an example. That is, in this embodiment, the use purpose is described as mail. Here, the portion identical to Embodiment 1 will not be repeated.

### 2-1. Design/setup of network

It is identical to that of Embodiment 1.

### 2-2. Setup of hardware for the various functions

It is identical to that of Embodiment 1.

## 2-3. Collection of packets

It is identical to that of Embodiment 1.

## 2-4. Authentication

It is identical to that of Embodiment 1.

## 2-5. Guiding for the user by menu (navigation)

When authentication is a success, menu is displayed to restrict the transmission/reception of mails at computer (102) and portable terminal (101). On the other hand, when authentication fails, /20 communication is made with authentication function (200a), and if the number of rounds is within the tolerable number of rounds of failure, authentication is repeated. On the other hand, if it surpasses the tolerable number of rounds, the error message is displayed to the user, and use is stopped.

Even when the transmitted mail address is out of network segment (201), by means of data communication path fixing function (200c), the data communication is performed through network segment (201) of the present embodiment for sure.

Also, by means of the information for distinguishing the business and personal uses of the preset mail address, etc., distinguishing is made for the mail addresses related to business and those not related, and the results are recorded.

## 2-6. Control of data communication path of the user

By means of remote mail proxy transmission function (200c-3) and address conversion function (200c-4) (to be explained later) of data communication path fixing function (200c), the data

communication path is fixed such that all of the mail communications of the user go through network segment (201) of the present embodiment for sure.

When the main address is within network segment (201) of the present embodiment, even without using data communication path fixing function (200c), the data communication still goes through network segment (201) of the present embodiment for sure. Only in this case, data communication path fixing function (200c) generates the communication records that records which mail address the user sent the mail and which mail address received the mail, and stores the data in the communication records database. The communication records of the mail address out of network segment (201) of the present embodiment generates the communication records by remote mail proxy transmission function (200c-3) to be explained later. Recorded in the communication records are the user's ID, date/time, receiver's mail address, user's IP address, user's TCP port number, etc.

All of the packet information going through network segment (201) in the present embodiment realized by this function is stored in packet collection database (206) as packet records by packet collecting function (200d), and it is thus possible to charge a specific communication fee for each mail.

Just as in the prior art, if this function is not there, the data communication of transmission/reception of mails other than default network segment (201) from portable terminal (101) and computer (102) does not go through the default network as direct communication is made with the mail server and the portable terminal or computer, so that all of the packet records cannot be stored, and it is impossible to generate the charging data.

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## 2-7. Transmission of remote mail address

In order to enable use of the mail address out of network segment (201) in the present embodiment, remote mail proxy transmission function (200c-3) acquires the mail address in network segment (201) of

the present embodiment, and uses it to perform transmission/reception with portable terminal (101) or computer (102). This remote mail proxy transmission function (200c-3) is assembled as a portion of data communication path fixing function (200c).

In the following, an explanation will be given regarding an example of operation of a practical remote mail proxy transmission function (200c-3) with reference to Figure 11. As an example, it is assumed that mail is sent to an external mail address. Suppose the case when the address of the server of data communication path fixing function (200c) is "aaa.bbb.co.jp", the user's address is "ccc@aaa.bbb.co.jp". When mail is to be sent by the user to "zzz@xxx.yyy.co.jp", the mail address is rewritten to "Zzz#XXX.yyy.co.jp?ccc@aaa.bbb.co.jp". The portion of "?" of this mail address is said remote mail proxy transmission function (200c-3). In the practice, the letter sequence of "?" and "#" may be selected at will. In this format, the mail address is assigned, and remote mail proxy transmission function (200c-3) transmits the mail to the mail address assigned by the letter sequence ahead of "?". Here, "#" stands for "@".

This remote mail proxy transmission function (200c-3) also generates the communication records in the communication records database.

## 2-8. Address conversion in real time

Although remote mail proxy transmission function (200c-3) can be used to fix the data communication path, in order to have it as a steady function all the time, there should be address conversion function (200c-4) that performs real time conversion to the mail address commonly used by the user with the counter in remote mail proxy transmission function (200c-3).

In said example, in the system of remote mail proxy transmission function (200c-3), the post-append

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portion of "?ccc@aaa.bbb.co.jp" is automatically inserted, and "@" of the receiver is written to "#", that is, address conversion function (200c-4) performs real time analysis for the received mail, converts to the mail address commonly used by the user, and then transmits the mail. As an example, in the case when the conventional mail address of the user is "[1]ccc@111.222.co.jp", the mail address is analyzed in real time, and conversion is performed from "[2]ccc@aaa.bbb.co.jp" to "[3]ccc@111.222.co.jp", and the mail is then transmitted.

As a result, all of the mails acquired by remote mail proxy transmission function (200c-3) go through network segment (201) in the present embodiment. This address conversion function (200c-4) is a portion of remote mail proxy transmission function (200c-3).

## 2-9. Cache of mail

In order to have data communication path fixing function (200c), remote mail proxy transmission function (200c-3) and address conversion function (200c-4) provided to more users, and to reduce the load while operating more efficiently, the mail data are cached, and the cached mail data are used in simultaneous multi-destination mail transmission/reception. This is realized by means of cache management function (200c-5). The cached mail is immediately erased after transmission.

## 2-10. Generation of charging information

It is the same as that in Embodiment 1.

Figure 12 is a flow chart illustrating the overall operation of the main transmission treatment in Embodiment 2.

As data communication path fixing function (200c) is turned ON in company with mail transmission (step 30), by means of said remote mail proxy transmission function (200c-3), the prescribed

transmission error is managed, while the mail transmission treatment is executed (step 31, step 32, step 33, step 34, step 40, step 39). In the case of the transmission property, after execution of the address conversion by means of address conversion function (200c-4) (step 35), judgment is made on yes/no of simultaneous multi-destination mail transmission (step 36). If YES, cache management function (200c-5) is used (step 37). If NO, the mail delivery is directly executed. Access recording for each mail use is executed by data collection on the e-mail protocol or other protocol hierachal layer higher than the hierachal layer of TCP/IP, and it is stored in the communication records database (step 38). The data collected in the communication records database are merged with the results of collection of packet collecting function (200d) that performs data collection on the Ethernet level, and, for each mail address, that is, for each use purpose, charging treatment is performed. This is identical to the case of said Embodiment 1.

According to Embodiment 2 of the present embodiment, the same effects as those of said Embodiment 1 can be realized, and at the same time, it is possible to realize charging treatment that can distinguish business and personal uses including mail service.

In the above, an explanation has been given in detail on the embodiments of the present invention. However, the present invention is not limited to the aforementioned embodiments. As long as the gist is observed, various modifications can be made.

For example, the application range of the data charging technology of the present invention is not limited to the data communication. It may also be adopted in the voice coding data communication system (Voice over IP system, Voice over Frame Relay system, etc.). As a result, it can be adopted in a communication system that performs simultaneous transmission/reception of voice and data. Consequently, it is possible to distinguish between business and personal uses for the voice call in the voice coding data communication system.

## Industrial application field

According to the data charging method of the present invention, the following effect can be realized: in the data communication of the passed packet number charging type, it is possible to realize specific fee charging for each utilization purpose of the information network and information resource used from the information communication terminal, such as computer, portable terminal, etc.

As another effect of the data charging method of the present invention, in the data communication using the information network by the information communication terminal, it is possible to realize reliable charging for diversified use purposes.

As yet another effect of the data charging method of the present invention, by using the information communication terminal for both business and personal uses, it is possible to improve the convenience of the user and enterprise, and it is also possible to realize appropriate pickup of the fee by clarifying the business and personal use portions of the use fees of the information communication terminal and data communication.

As yet another effect of the data charging method of the present invention, it is possible to provide diversified services by setting a variety of unit prices for different utilization purposes and data types.

As yet another effect of the data charging method of the present invention, it is possible to find out the information of the use states of different use purposes by the user at the information communication terminal, so that it is possible to realize reliable marketing of data communication services.

As an effect of the data charging system of the present invention, in the data communication of the passed packet number charging type, it is possible to realize specific fees of different use purposes of the information network and information resources used by the information communication terminal, such as computer, portable terminal, etc.

As another effect of the data charging system of the present invention, in the data communication using the information network by the information communication terminal, it is possible to realize reliable diversified charging for different use purposes.

As yet another effect of the data charging system of the present invention, by using the information communication terminal for both business and personal uses, the convenience of the user and business is improved, and at the same time, by clearly distinguishing the business and personal use of the use fees of the information communication terminal and data communication, payment of the fees can be made appropriate.

As yet another effect of the data charging system of the present invention, by setting a variety of unit prices for different use purposes and data types, it is possible to realize diversified services.

As yet another effect of the data charging system of the present invention, it is possible to determine the information of the use states of the different utilization purposes by the user at the information communication terminal, and it is possible to realize reliable marketing of data communication service.

## Claims

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1. A data charging method characterized by the fact that in a data charging method that performs charging corresponding to the quantity of the data in the information network where information communication terminals are used to perform transmission/reception of information by the users, the data quantity is classified for different use purposes of data and collected so that a charge is made for each use purpose.

2. The data charging method described in Claim 1 characterized by the fact that a prescribed network segment is set on said information network, and said data transmission/reception is performed via said network segment, so that the quantity of said data are collected for each said utilization purpose.

3. The data charging method described in Claim 1 or 2 characterized by the fact that in the different protocol hierachal layers in the communication protocol of said data in said information network, the address information on said information network in company with said data is collected and checked so that the quantity of the data is classified and collected for each said use purpose of said data.

4. The data charging method described in Claim 1, 2 or 3 characterized by the fact that for each said use purpose, the charging unit price of said data and/or the requesting party are set to perform charging.

5. The data charging method described in Claim 1, 2, 3 or 4 characterized by the fact that said information network is the internet that performs said data transmission/reception by TCP/IP communication, said information communication terminal is a mobile communication terminal or personal computer, and said data are the packets of said TCP/IP communication.

6. A type of data charging system characterized by the fact that in the data charging system that performs charging corresponding to the data quantity on the information network where information communication terminals are used by the users to perform transmission/reception of information, there are the following parts:

a network segment connected to the information network,

a data communication path controlling means that fixes the data communication path pertaining to a prescribed user such that is passes through the network segment,

a first data collecting means that collects the first information containing the quantity of the data pertaining to the data passing said network segment,

a second data collecting means that collects the second information that allows specification of the utilization purpose by each individual user for the data passing through the network segment,

and a charging information generating means that generates the charging information for each use purpose on the basis of the first and second information.

7. The data charging system described in Claim 6 characterized by the fact that it contains a user authentication means that identifies said user of said information communication terminal, and a menu presenting means that guides said user to make access to said information network via said network segment.

8. The data charging system described in Claim 6 characterized by the fact that said first and second data collecting means collect said first and second information in the different protocol hierachal layers in the communication protocol of said data in said information network.

9. The data charging system described in Claim 6 characterized by the fact that said data communication path control means include an address conversion function, which takes place when said user performs said data transmission/reception and which performs dynamic refreshing for the first address information that specifies the information resource in said information network so that it contains the second address information that specifies said network segment in said information network, and the information resource proxy acquisition function, which acquires said data of the information resource on said information network requested by the user in said network segment, and then transmits it to said information communication terminal of said user of the requesting party.

10. The data charging system described in Claim 6 characterized by the fact that said information network is the internet that performs transmission/reception of said data by means of TCP/IP communication, said information communication terminal is a mobile communication terminal or a personal computer, and said data are the packets of said TCP/IP communication. /27

11. The data charging system described in Claim 6 characterized by the fact that said charging information generating means perform charging by setting the charging unit price of said data and/or the requesting party for each said use purpose.

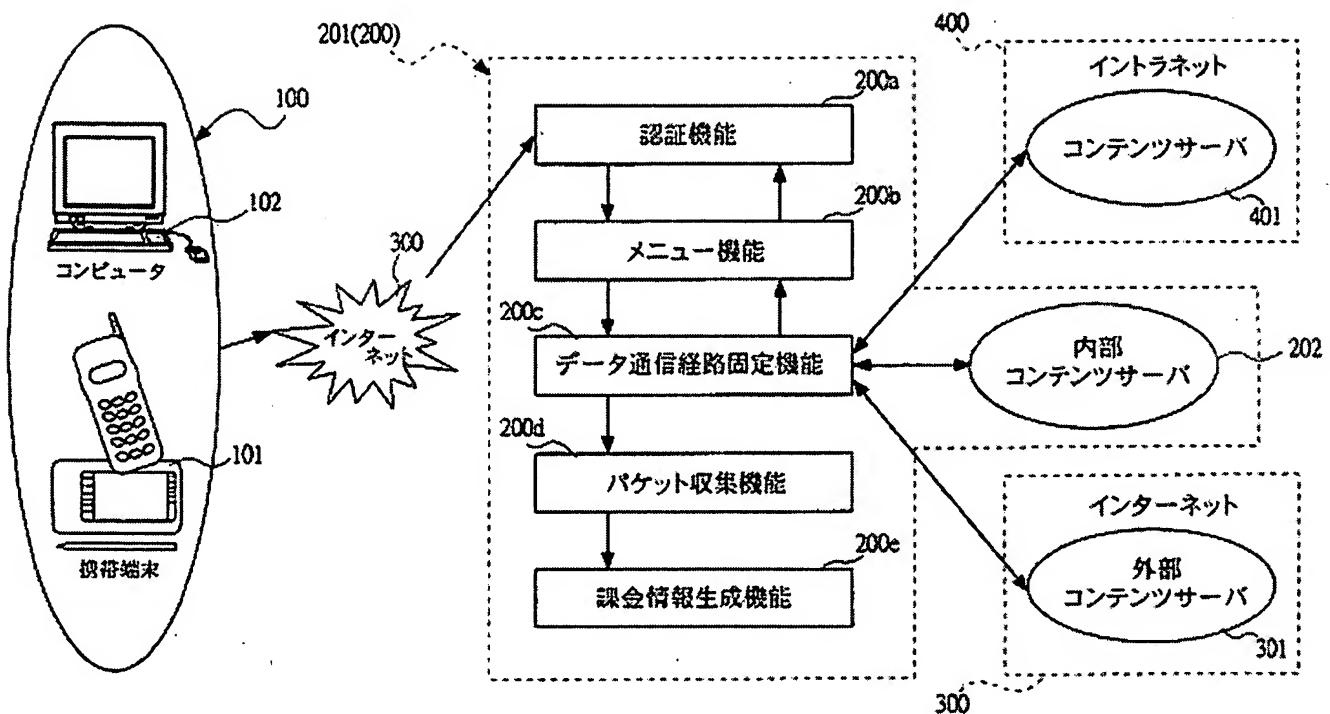


Figure 1

Key: 101 Portable terminal

102 Computer

200a Authentication function

200b Menu function

200c Data communication path fixing function

200d Packet collecting function

200e Charging information generating function

202 Internal contents server

300 Internet

301 External contents server

400 Intranet

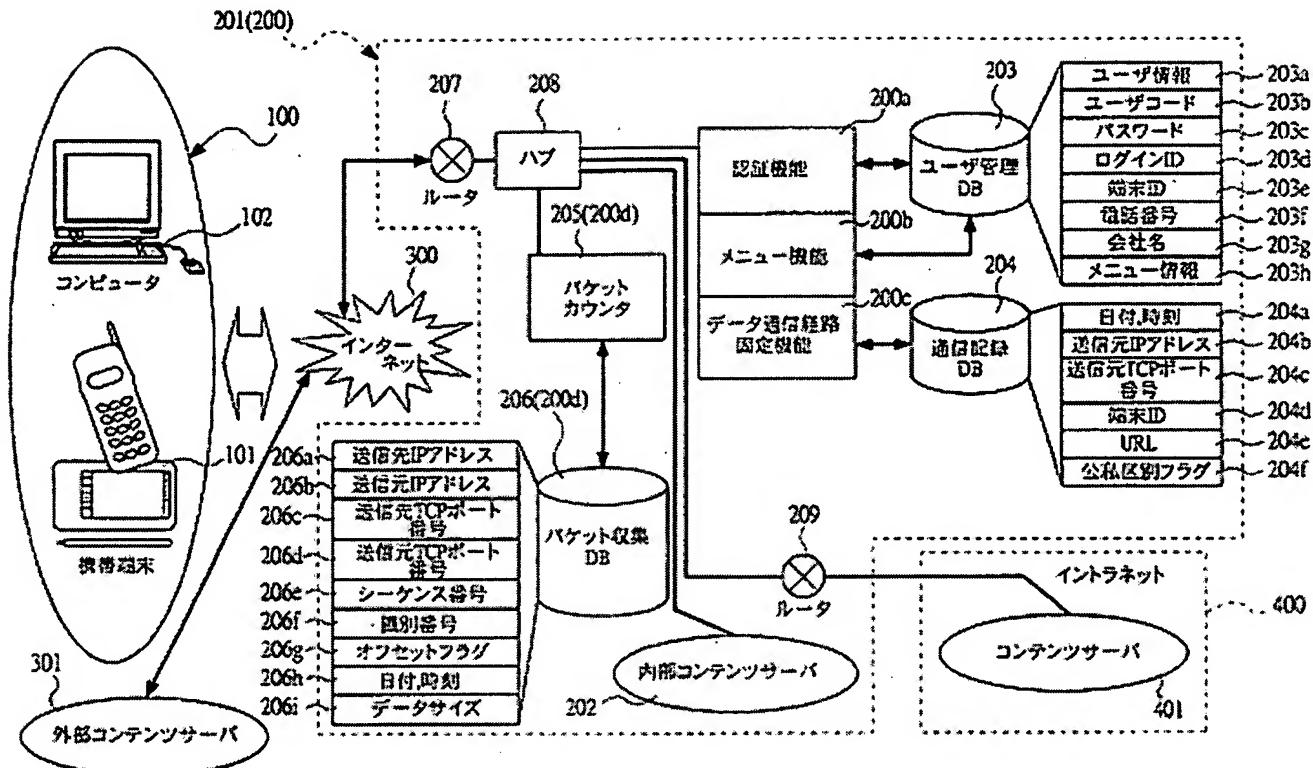


Figure 2

Key:

- 101 Portable terminal
- 102 Computer
- 200a Authentication function
- 200b Menu function
- 200c Data communication path fixing function
- 202 Internal contents server
- 203 User management database
- 203a User information

203b	User coder
203c	Password
203d	Log-in ID
203e	Terminal ID
203f	Telephone number
203g	Company name
203h	Menu information
204	Communication records database
204a	Date/time
204b	Sender IP address
204c	Sender TCP port number
204d	Terminal ID
204e	URL
204f	Business/personal use distinguishing flag
205(200d)	Packet counter
206(200d)	Packet collecting function
206a	Receiver IP address
206b	Sender IP address
206c	Receiver TCP port number
206d	Sender TCP port number
206e	Sequence number
206f	Identification number
206g	Offset flag

206h	Date/time
206i	Data size
207	Router
208	Internet hub
209	Router
300	Internet
301	External contents server
400	Intranet
401	Contents server

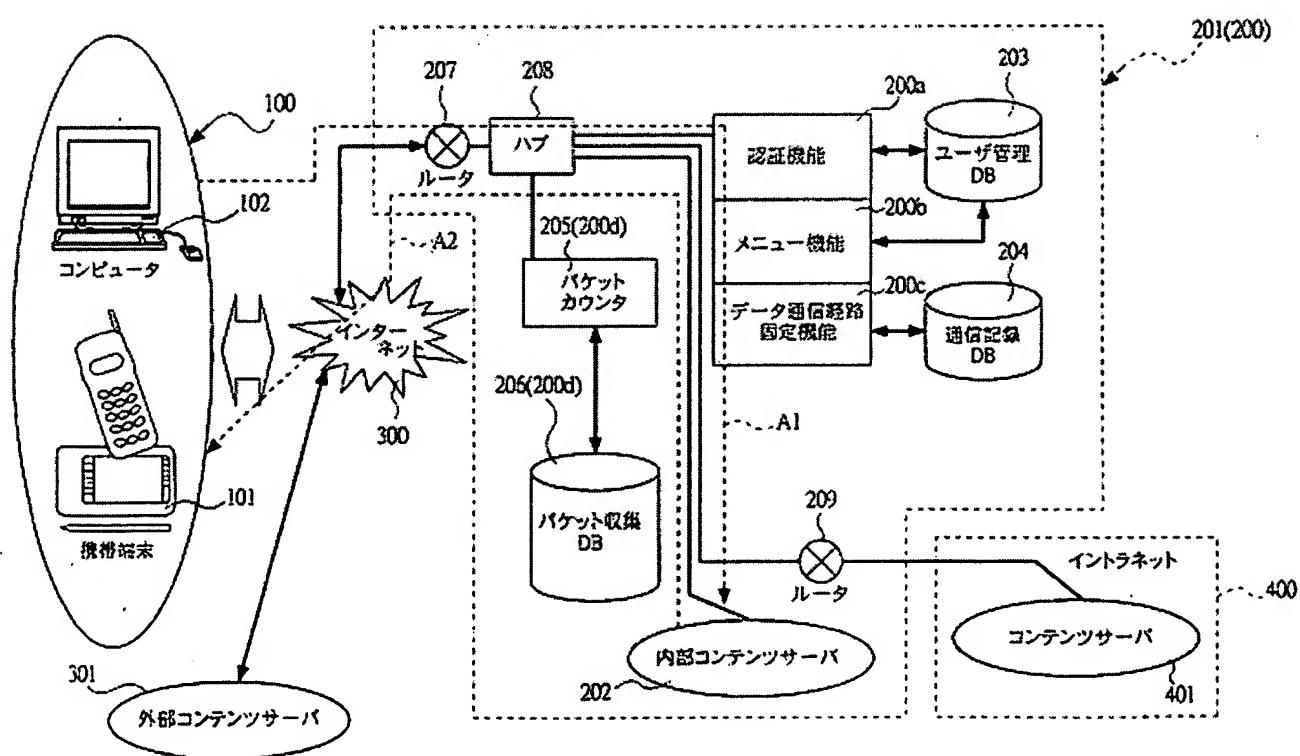


Figure 3

Key:	101	Portable terminal
	102	Computer
	200a	Authentication function
	200b	Menu function
	200c	Data communication path fixing function
	202	Internal contents server
	203	User management database
	204	Communication records database
	205 (200d)	Packet counter
	206(200d)	Packet collection database
	207	Router
	208	Internet hub
	209	Router
	300	Internet
	301	External contents server
	400	Intranet
	401	Contents server

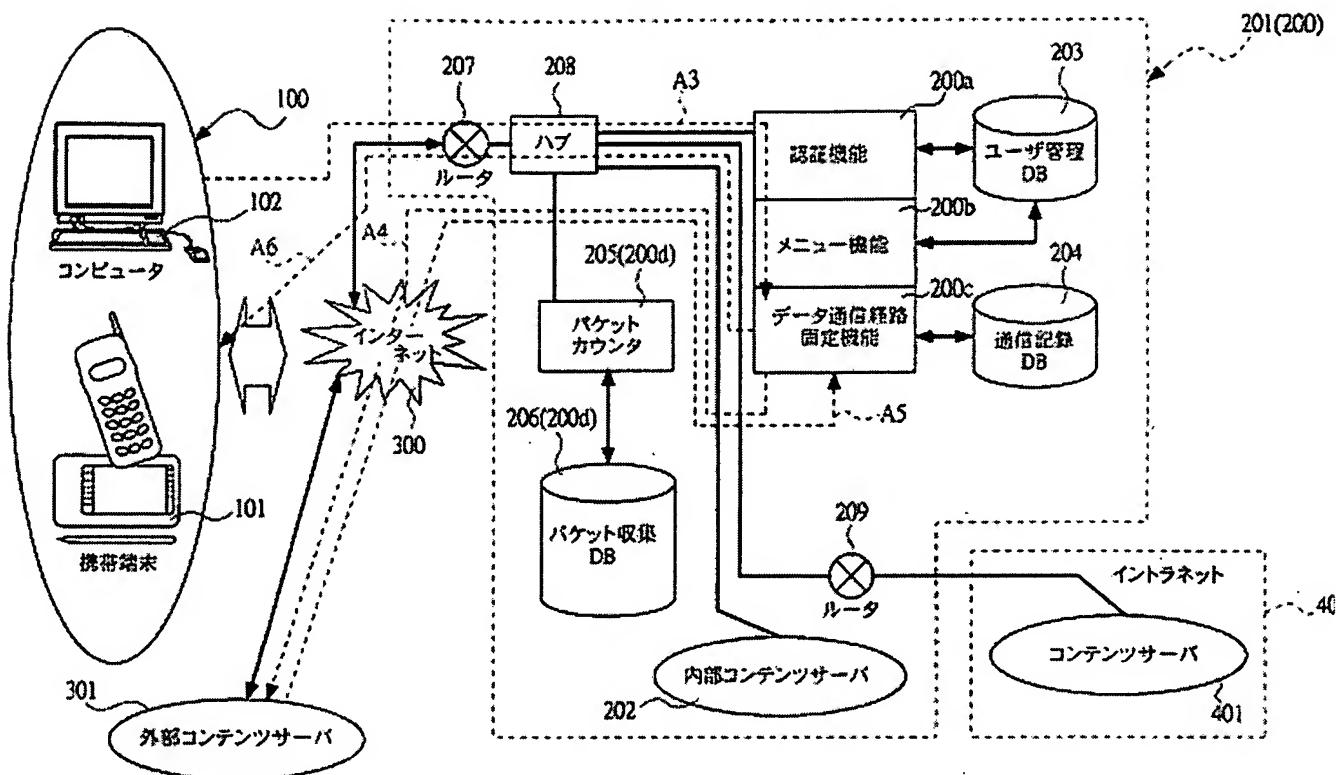


Figure 4

Key:	101	Portable terminal
	102	Computer
	200a	Authentication function
	200b	Menu function
	200c	Data communication path fixing function
	202	Internal contents server
	203	User management database
	204	Communication records database
	205(200d)	Packet counter
	206(200d)	Packet collection database

207	Router
208	Internet hub
209	Router
300	Internet
301	External contents server
400	Intranet
401	Contents server

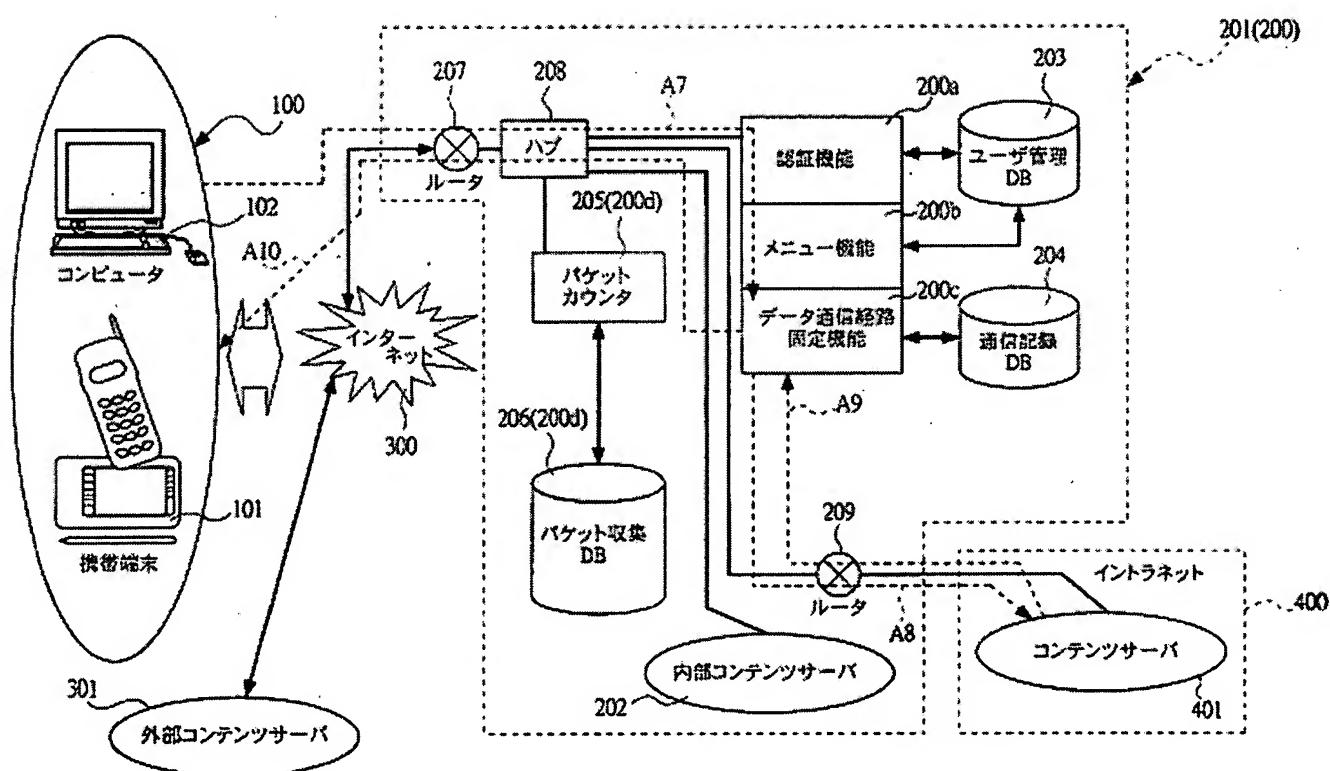


Figure 5

Key: 101	Portable terminal
102	Computer

200a	Authentication function
200b	Menu function
200c	Data communication path fixing function
202	Internal contents server
203	User management database
204	Communication records database
205(200d)	Packet counter
206(200d)	Packet collection database
207	Router
208	Internet hub
209	Router
300	Internet
301	External contents server
400	Intranet
401	Contents server

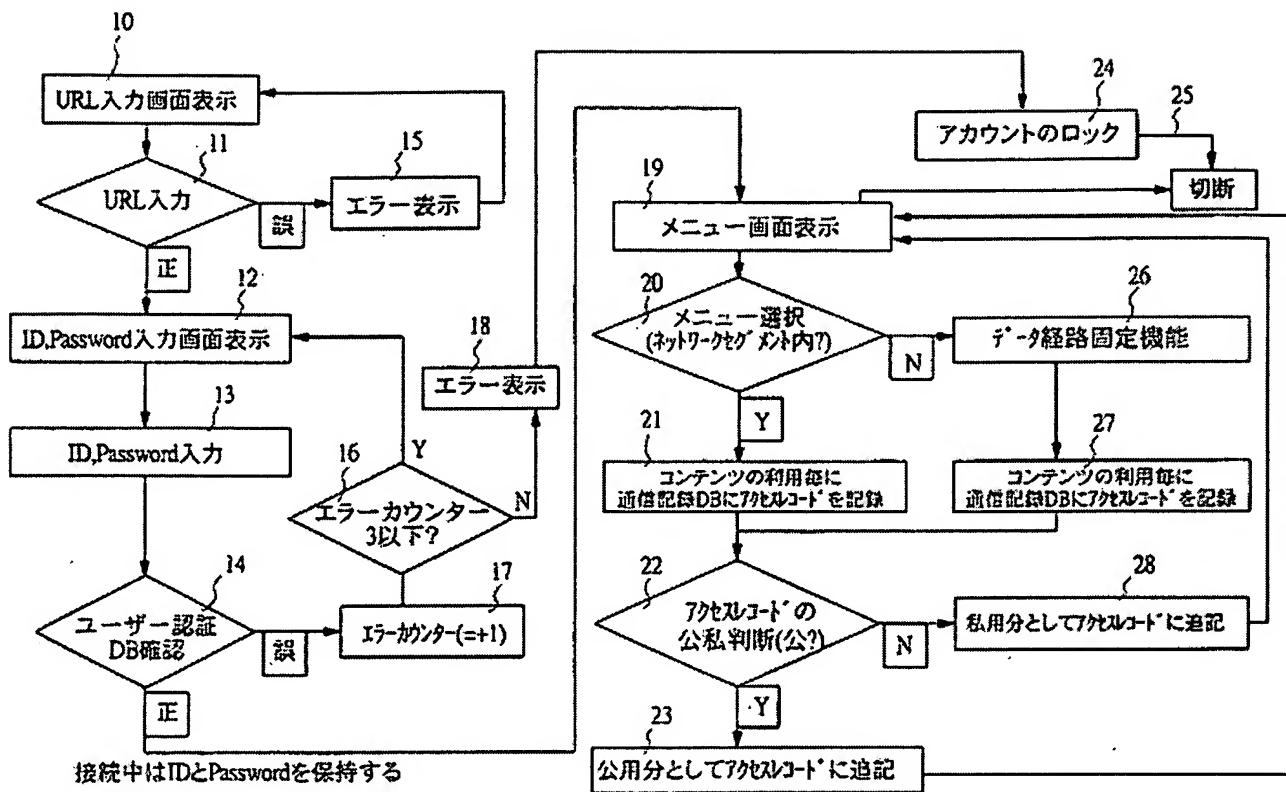


Figure 6

Key: a Error

b Correct

c Hold of ID and password during connection

10 Display of URL input picture

11 URL input?

12 Display of ID, Password input picture

13 Input of ID, Password

14 User authentication DB checking?

15 Error display

- 16 Error counter of 3 or smaller?
- 17 Error counter ( $=+1$ )
- 18 Error display
- 19 Menu picture display
- 20 Menu select (within network segment?)
- 21 Recording of access records in communication records DB for each utilization of contents
- 22 Judgment of business and personal uses of access record (business use?)
- 23 Additive storage in access records as business use portion
- 24 Lock of count
- 25 Cut
- 26 Data path fixing function
- 27 Recording of access records in communication records DB for use utilization of contents
- 28 Additive recording as personal use portion in access records

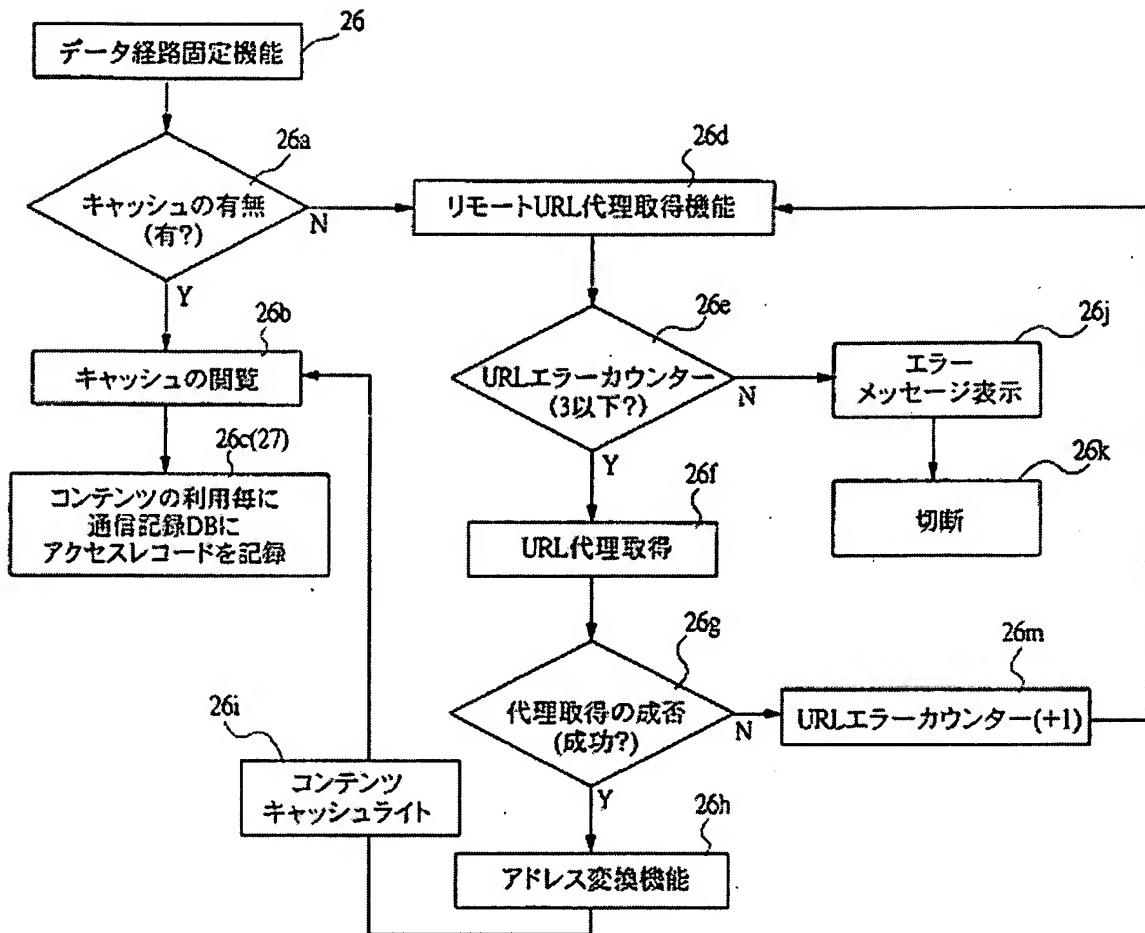


Figure 7

Key: 26 Data path fixing function

26a YES/NO of cache? (Yes?)

26b Read of cache

26c(27) Recording of access records in communication records DB for each utilization of contents

26d Remote URL proxy acquisition function

26e URL error counter (3 or smaller?)

26f Acquisition of URL proxy

- 26g YES/NO of acquisition of proxy (success?)
- 26h Address conversion function
- 26i Cache contents write
- 26j Display of error message
- 26k Cut
- 26m URL error counter (+1)

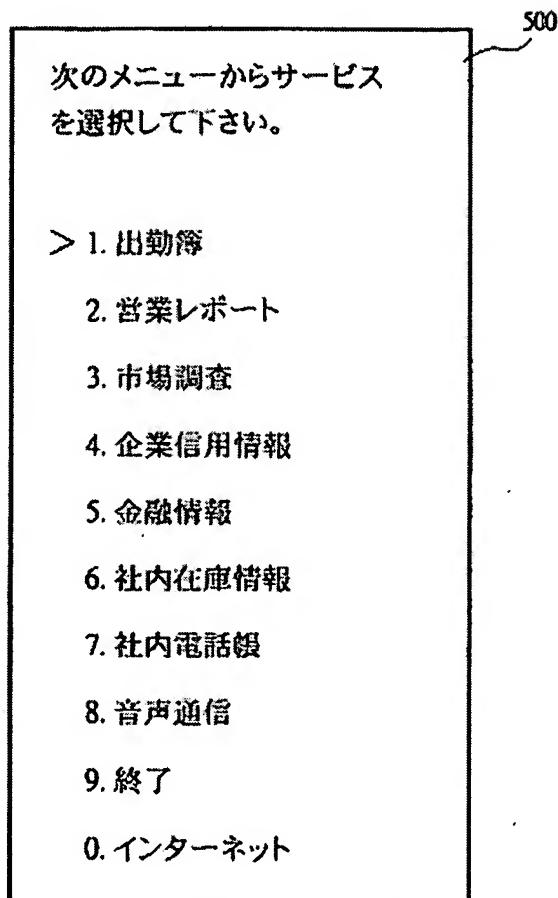


Figure 8

Key: 500 Please select service from the following menu:

a > 1. Records of attendance

2. Business report
3. Market survey
4. Enterprise credit information
5. Financial information
6. Internal stock information
7. Internal telephone book
8. Voice communication
9. End
0. Internet

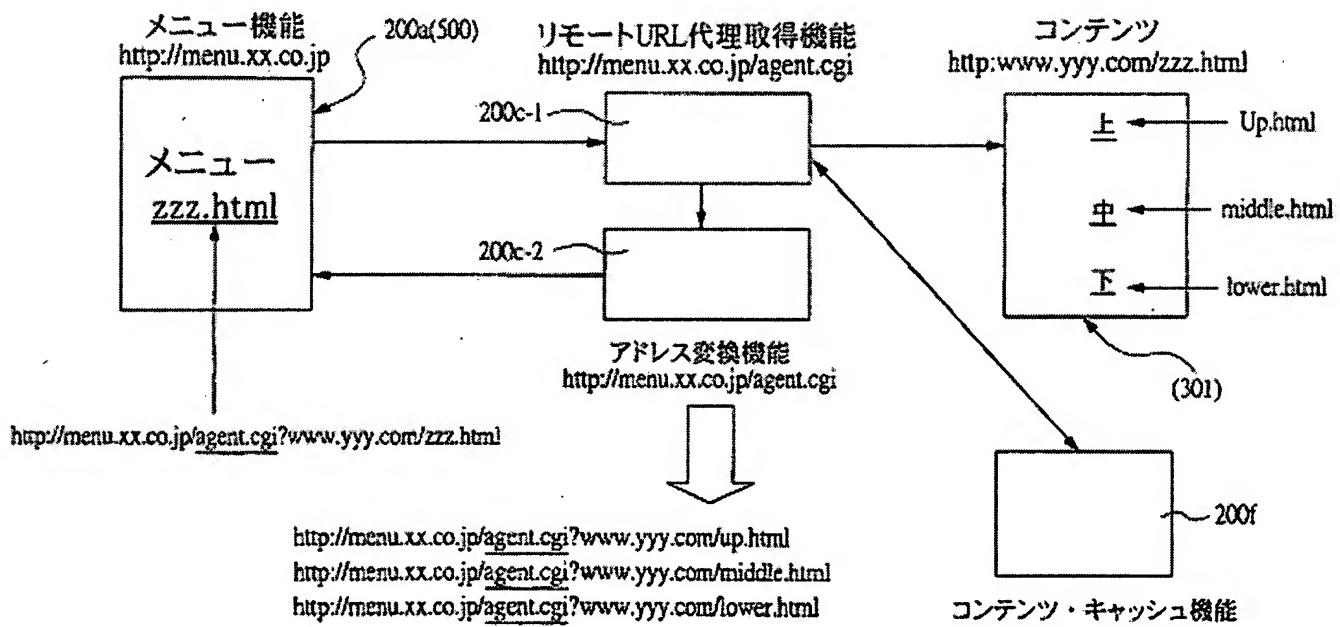


Figure 9

Key:

- 1 Menu function
- 2 Menu

- 3 Remote URL proxy acquisition function
- 4 Address conversion function
- 5 Contents
- 6 Upper

Middle

Lower

- 7 Contents-cache function

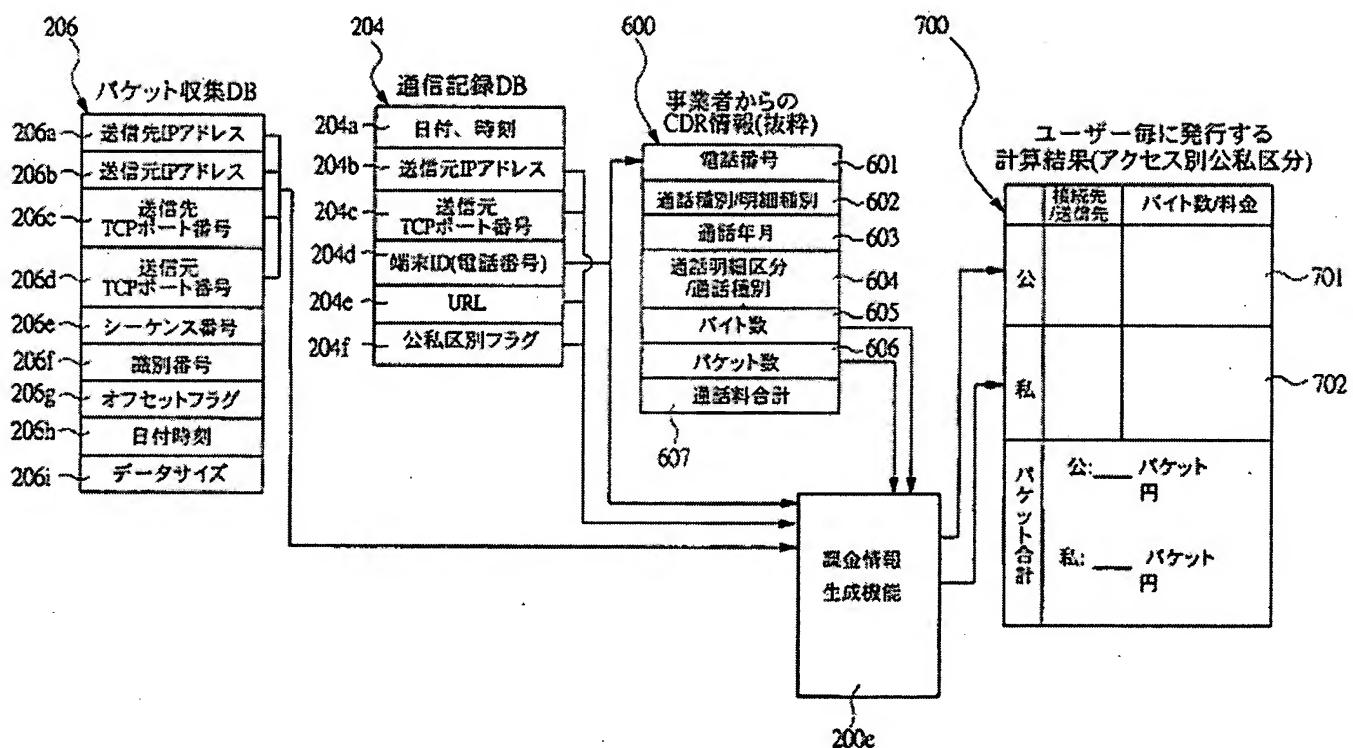


Figure 10

Key: a Computing results issued to each user (distinguishing for access as business and personal uses)  
 b Receiver/sender

Byte number/fee

- c Business use
  - Personal use
  - Packet sum
- d Business use \_ packet
  - ¥
  - Personal use \_ packet
    - ¥

206 Packet collection DB

- 206a Receiver IP address
- 206b Sender IP address
- 206c Receiver TCP port number
- 206d Sender TCP port number
- 206e Sequence number
- 206f Identification number
- 206g Offset flag
- 206h Date/time
- 206i Data size

204 Communication records DB

- 204a Date/time
- 204b Sender IP address
- 204c Sender TCP port number
- 204d Terminal ID

204e URL

204f Business/personal use distinguishing flag

600 CDR information from provider (abstract)

601 Telephone number

602 Call type/details type

603 Call year/month

604 Call details classification/call type

605 Byte number

606 Packet number

607 Call fee sum

200e Charging information generating function

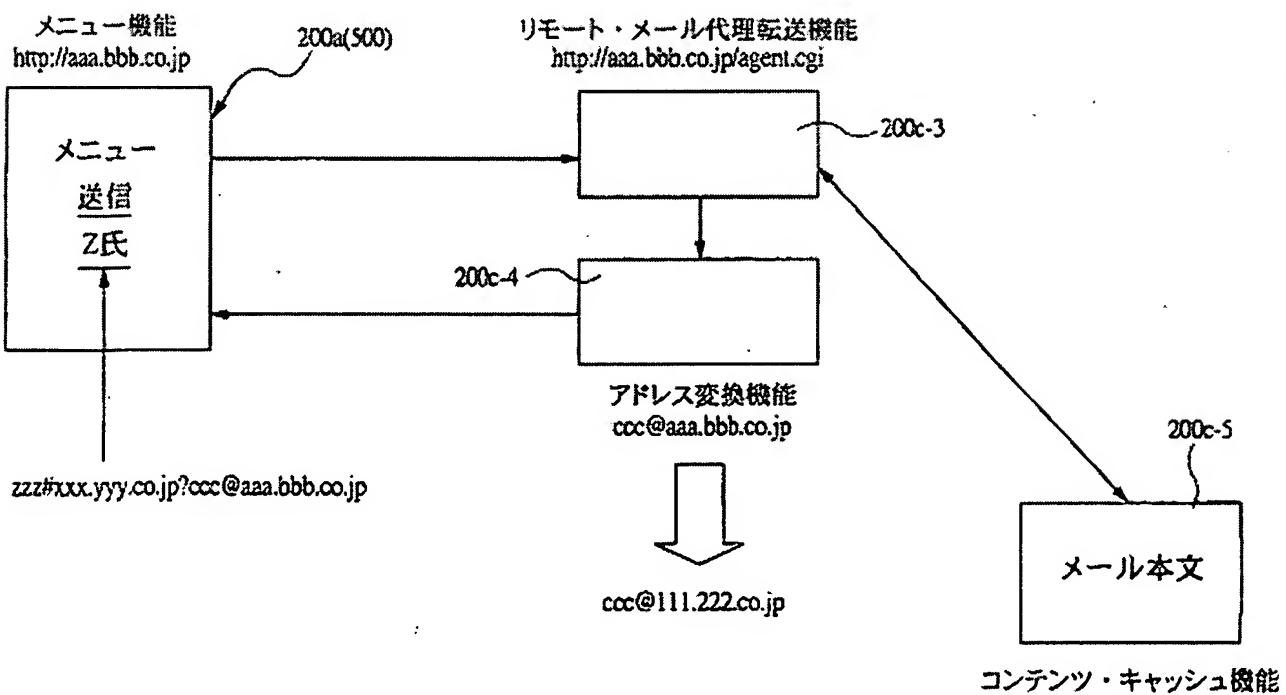


Figure 11

Key:

- a Menu function
- b Menu
- c Send
- d Mr. Z
- e Remote mail proxy transmission function
- f Address conversion function
- g Text of mail
- h Contents-cache function

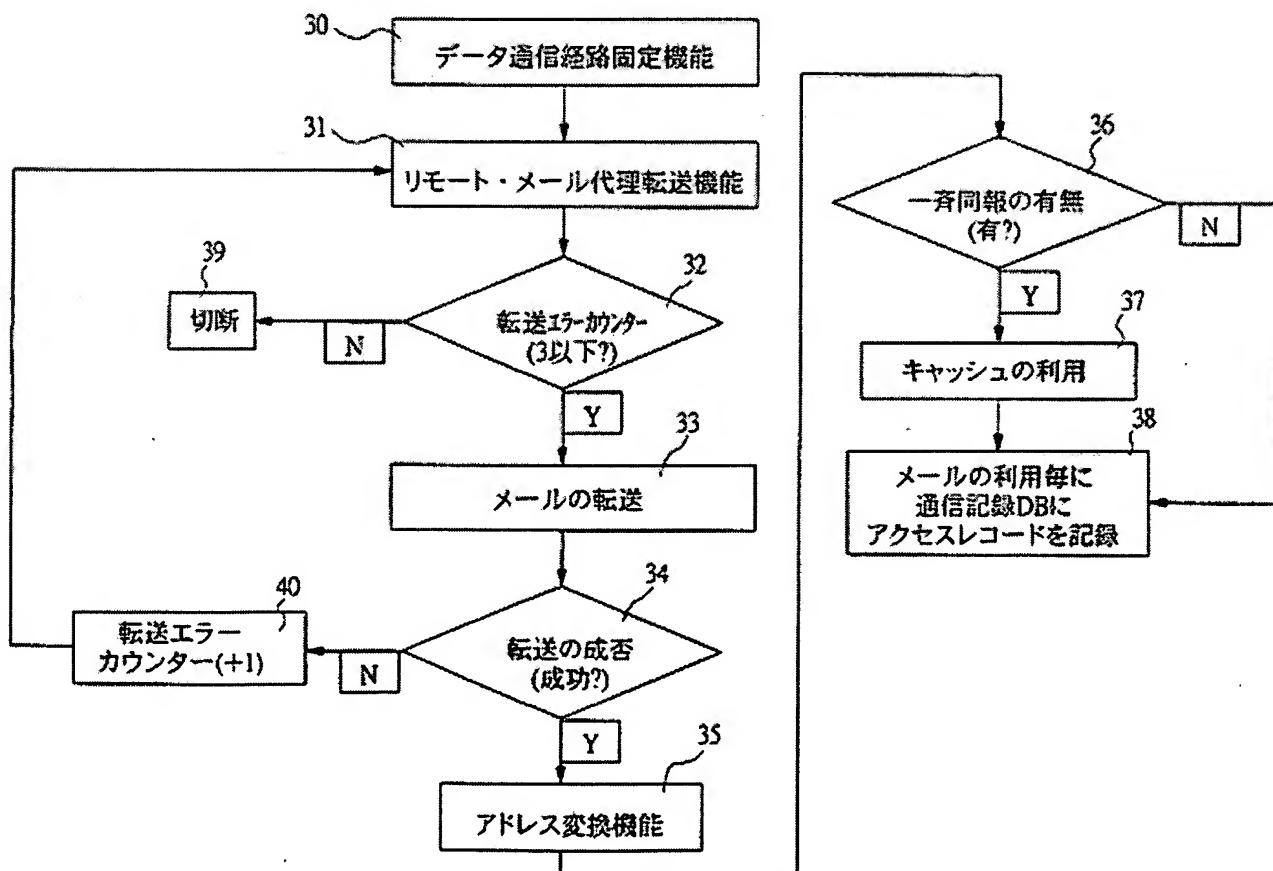


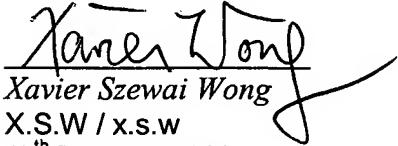
Figure 12

Key: 30 Data path fixing function  
31 Remote mail proxy transmission function  
32 Transmission error counter (3 or smaller?)  
33 Transmission of mail  
34 YES/NO of success of transmission (success?)  
35 Address conversion function  
36 YES/NO of simultaneous multi-destination mail transmission (YES?)  
37 Utilization of cache  
38 Recording of access records in communication records DB for each utilization of mail  
39 Cut  
40 Transmission error counter (+1)

***REMARKS***

Attached is a Certified English Translation copy of WO 01/78317 A1 – Nakai et al.

Sincerely,

  
*Xavier Szewai Wong*  
X.S.W / x.s.w  
17<sup>th</sup> December 2007